

# NISTTech

## HLPR Chair: Home Lift Position & Rehabilitation Apparatus

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**Allows a patient to remain independent at home and to stand & walk for rehabilitation**

### Description

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The Home Lift, Position and Rehabilitation (HLPR) Chair is a powered wheelchair with lift and transfer capability that could be used in hospitals, rehabilitation centers, physical therapy, nursing homes, and private home care. No other medical device provides multiple functions like the HLPR Chair with basic mobility similar to a typical powered chair. However, HLPR also provides lift to reach from the floor to tall shelves. It allows patients to stand and walk on the floor while being supported for rehabilitation so the patient does not need to leave the home or hospital room locality to exercise or be rehabilitated. And with a unique chair rotation capability, HLPR can transfer a patient independently onto a toilet or bed or chair with no or minimal help from caregivers. This design can dramatically reduce the more than 200,000 nurse and caregiver injuries costing approximately \$1 billion per year in the US while maintaining patient dignity and independence.

With a simple joystick and switches the patient controls their own mobility, lift and/or positioning. A duplicate joystick set is provided for a nurse or caregiver in cases where patients are not independent. Even initial autonomous HLPR Chair mobility has been successfully tested to allow one button commands to dock with a toilet. Sip and puff, voice, and other input types could be used with the HLPR Chair. A unique sling has been developed and tested or off- the- shelf slings can be used with HLPR to support and/ or help transfer the patient. HLPR can enter through most home doorways depending upon patient size as its design scales easily to support a small patients through very large bariatric patients.

Two full- scale, 'looks- like, works- like' units have been built and tested in the NIST Manufacturing Engineering Laboratory. Static and dynamic stability tests have been completed. Designs for improving HLPR as an elevator for multi- story homes, patient removal from cars at emergency rooms, and lifting patients who have fallen to the floor are conceptualized and ready to build and test.

### Images

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HLPR Chair assisting in patient walking



HLPR Chair safely lifting a patient to reach a high shelf

## Applications

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- **Rehabilitation**  
Enables patients with severe leg problems to exercise and walk while being either fully supported or aided.
- **Patient care**  
This patient-assistance device enables wheelchair users independence.

## Advantages

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- **Mobility**  
Allows patients to move around at eye-level with those not in wheelchairs; assists in reaching high places; transfers patients from place to place; and avoids muscle atrophy.
- **Patient independence**  
This device enables the user to move about an area on their own.

## Abstract

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On HLPR Chair 2, the "seat slide with passive extend" design includes a pair of thin, passive, linear slides beneath the seat and a set of springs that allow both the seat and footrest to slide with respect to the rotate seat retract U-plate. This allows a standard size seat to be attached to HLPR Chair 2. The original seat rotate design on HLPR Chair 1 allowed only a seat as long as the seat lift actuator. Hence, a short seat was required to allow only the seat to completely rotate up out of the way of the patients' bottom to access seats, beds and toilets. The HLPR Chair 2 seat slide

design will now allow larger and/or less agile patients to use the HLPR Chair.

## Inventors

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- Albus, James S.
- Bostelman, Roger V.

## Citations

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1. R. Bostelman and J. Albus. Sensor experiments to facilitate robot use in assistive environments. Proceedings of the 1st international conference on Pervasive Technologies Related to Assistive Environments ACM. New York, NY, 2008.

## Related Items

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- Manufacturing Metrology and Standards for the Health Care Enterprise Program Healthcare Mobility Project
- Demonstration Video
- Article: Robot Wheelchair May Give Patients More Independence
- MERWYN Business Simulation Report

## References

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- U.S. Patent # 7,827,630
- Docket: 08-002

## Status of Availability

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This invention is available for licensing.

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